THE EFFECT OF A CHANGE IN PHYSIOLOGICAL AROUSAL ON AN INDUCED MOOD

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ABSTRACT

Two recent review papers, Cotton (1981) and Reisenzein (1983), have called into question the claims of Schachter and Singer (1962). Two of these claims

i) That misattribution from an extraneous source intensifies an emotional reaction and

ii) That arousal reduction leads to a reduction in the intensity of emotional state

are discussed and examined. The results indicate that while these claims are not supported by the data in all cases examined, partial support is provided for them. A predictor of the results was found in Davitz (1969) and is discussed.

CHAPTER I

INTRODUCTION

In 1962 Stanley Schachter and Jerome Singer published the now classic Psychological Review paper entitled: Cognitive, Social and Physiological Determinants of Emotional State. In this paper Schachter and Singer put forward three propositions which they attempted to support by experiment. The propositions are:-

1) Given a state of physiological arousal for which an individual has no immediate explanation he will 'label' this state and describe his feelings in terms of the cognitions available to him. To the extent that cognitive factors are potent determinants of emotional states it could be anticipated that precisely the same state of physiological arousal could be labeled 'joy' or 'fury' or 'jealousy' or any of a great diversity of emotional labels depending on the cognitive aspects of the situation.

2) Given a state of physiological arousal for which an individual has a completely appropriate explanation (eg: 'I feel this way because I have just received an injection of adrenalin'), no evaluative needs will arise and the individual is unlikely to label his feelings in terms of the alternative cognitions available.

3) Given the same cognitive circumstances, the individual will reach emotionally or describe his feelings as emotions only to the extent that he experiences a state of physiological arousal.

After a series of experiments using epinephrine as an arousal agent and manipulated cognitions, Schachter and Singer concluded that they had provided strong

evidence for propositions one and two, and tentative evidence for proposition three. However, since then, two review papers have been published which question these conclusions.

Cotton (1981) found that there was little evidence to support Schachter and Singer's propositions but that there was also little evidence to disprove their work either. He cites Marshall and Zimbardo's (1979) and Maslach's (1979) unsuccessful attempts at replicating Schachter and Singer (1962) to which he states they "... do not disprove the theory; they only invalidate the Schachter and Singer study". He does conclude though "that a 'strong' interpretation of Schachter's theory is not tenable".

The second of the review papers, Reisenzein (1983) also cites Marshall and Zimbardo (1979) and Maslach (1979) but is more harsh in its conclusions, only the deduction "that misattributed arousal from an extraneous source intensifies emotional reactions can be adequately supported by the data". He also states "little support is found for the second hypothesis, that arousal reduction leads to a reduction in the intensity of emotional state".

There is, however, confounding evidence in this area, as I will show, which means an unmodified version of Schachter and Singer's proposition three is untenable. Strong evidence though can be found to support the hypothesis "that arousal reduction leads to a reduction

in the intensity of emotional state", in some cases. In the following pages I will show why an unmodified proposition three is untenable, how it can be modified and why in some cases arousal reduction does lead to a reduction in the intensity of emotional state.

CHAPTER II

LITERATURE REVIEW

This section is divided into two parts. The first defines terms that have been referred to and the second reviews the literature.

2.1 DEFINITION OF TERMS

There are only two terms that need to be defined at this point:

(1) Cognition

This is used to refer to the way an event or situation is subjectively evaluated. Seeing a large dog may lead to an evaluation of danger or seeing a clown to the evaluation funny, etc. We evaluate events in our environment constantly and these evaluations are acted on. When Schachter and Singer refer to "the same cognitive circumstances" they mean an environment in which no events or situations alter and so there are no changes in evaluations.

(2) Arousal

Refers to activity of the peripheral vegetative system and is undifferentiated across emotions. An individual's level of arousal can be altered by temperature changes, drugs, exercise, relaxation etc.

2.2 REVIEW OF LITERATURE

(1) Anxiety

(a) Increase in Arousal. In this section some studies that have examined the effect that an increase in physiological arousal has on anxiety are discussed.

Driscoll (1976) compared the effect of physical exertion alone, with positive images alone and physical exertion and positive images together on experimentally induced anxiety. The anxiety produced by presenting the subjects with anxiety eliciting scenes which were chosen for each subject on the basis of how that subject had rated them previously. The physical exertion consisted of running on the spot with the knees being lifted but heels not being kicked back until the subject reported being tired. Anxiety was assessed with self-report questionaires which contained two distinct sets of items concerned with: i) apprehension ii) physiological change. Driscoll found that exertion alone, positive images alone and exertion and positive images together all produced anxiety reduction.

Hoon, Wincze and Hoon (1977) attempted to test the prediction that autonomic sexual and anxiety states are mutually inhibitory. Sexual arousal was induced by showing erotic videotapes and was measured by changes in vaginal blood volume. Anxiety was induced by exposure to a film which depicted automobile accidents and included death cries of the occupants.

The results indicated to the authors that sexual arousal was increased by the initial presence of anxiety which disconfirmed their prediction.

Bahrke and Morgan (1978) used 75 male subjects in their study to test the effects of exercise and meditation on anxiety. Anxiety was measured by the STAI X-1 (State) anxiety questionaire before and after the experimental manipulation.

Exercise consisted of 20 minutes on a motor-driven treadmill at 70% of each subjects self-imposed maximum heart rate. Subjects rated their perceived exertion at five minute intervals during the treadmill exercise and heart rate was recorded for the final 15 seconds of each minute. The results showed a significant decrease in anxiety following exercise as shown on the before and after state anxiety scales.

(b) Decrease in Arousal. This section reviews studies which have been concerned with the effects of decreased arousal on anxiety.

Johnson and Spielberger (1960) used 48 male hospitalised psychiatric patients aged between 25 and 55 years.

All subjects had a mental age of above 9.5 years, and none was judged to be out of touch with reality or had a diagnosis of chronic brain syndrome. Anxiety was measured by a systolic blood pressure, heart rate and a modified Zuckerman Affect Adjective Checklist. The method used to relax the subjects was to ask them to lie down quietly, relax their muscles, and think "quiet peaceful

thoughts". Anxiety measures were taken before and after the relaxation, and showed that there had been a significant decrease in anxiety after relaxation.

Friedman (1966) experimented with methohexitone sodium as an alternative to Jacobsonian muscle relaxation to treat public phobic anxiety. 25 subjects were used, all of whom were psychiatric out-patients suffering from phobic anxiety. The amount of methohexitone sodium used varied from 25 to 50mg across subjects but the dose was kept stable within subjects. Subjects received from six to eighteen sessions and all were symptom free at the end of their treatment.

Bahrke and Morgan (1978) looked at the effect of exercise and meditation on anxiety. The results from the exercise part of the experiment have already been discussed and the meditation part of the experiment was similar. 25 subjects were in the meditation group and completed the State anxiety scale before and immediately after a period of meditation. The meditation consisted of practicing a technique described on a tape. While this was occurring their resting metabolism was monitored. The results like those for the exercise condition showed a significant decrease in anxiety. The control group in this experiment who rested quietly for 20 minutes reading a Readers Digest magazine also showed a significant decrease in anxiety.

(2) Depression

(a) Increase in Arousal. A number of studies have been carried out which have used exercise as a treatment for clinically depressed patients. Kavanagh, Shephard, Tuck and Qureshi (1977) used subjects who had become depressed following myocardial infarction. 44 subjects were used all "post coronary" and all had high "D" scores on the Minnesota Multiphasic Personality Inventory (MMPI) 16-18 months after myocardial infarction. The exercise used for treatment consisted of personally prescribed long slow distance jogging. The patient could go as far and as fast as his or her condition and motivation allowed. After four years a significantly decreased "D" score ($p<0.001$) was associated with exercise compliance.

Brown, Ramirez and Taub (1978) used 700 subjects of which about 100 were clinically depressed. The 700 subjects were experimented on in two phases. In the first, the Zung Depression Scale, Eysenck Personality Inventory and Human Figure Drawings were used to measure the degree of depression. Subjects then exercised three days a week for 30 minutes a day minimum for ten weeks, and after that time the three tests were repeated. In the second phase, the MMPI depression scale, a sleep questionaire, the Activation-Deactivation Adjective Checklist and a Multi-factor Adjective Checklist were used as well as the three from phase one. Subjects were given the choice of: i) exercise three times a week; ii) exercise five times a week; iii) no exercise at all. With each period of exercise being 30 minutes as in phase one. As in phase

one the program lasted ten weeks and after that time all tests were readministered. The results for both phases showed that the greater the amount of exercise, the larger the decrease in depression. The five times a week group had the largest decrease, the three times a week group had also a significant decrease, whereas the no exercise group had no change. Both the clinically depressed group and normal subjects had decreases, and on the basis of this study the authors recommended:

> That any rational, safe and effective treatment regimen for depression should include a prescription for vigorous exercise to bring about and maintain optimal effective functioning.

Greist, Klein, Eischens and Faris (1978) used a running program to treat 24 people between the ages of 18 and 30, all of whom had moderate depression as measured on the depression cluster of the Symptom Checklist-90. Of the 24, nine were assigned to time limited psychotherapy, seven to time unlimited psychotherapy, and eight to running treatment. The running treatment consisted of three times a week for 30-45 minutes with a running therapist. The therapist never talked about depression while the patients were running and noted that "these patients never seem depressed when running". After three weeks, six of the eight from the running group had improved considerably, the seventh recovered at week 16, and the eighth showed no change either way. Running was more successful than both psychotherapy groups and the results were still present at a one year follow-up.

Greist, Klein, Eischens, Faris, Gurman and Morgan (1979) used patients seeking treatment for neurotic or reactive depression as subjects. 28 people were used and they were divided into three groups. The first group had 12 subjects who were given time unlimited psychotherapy, the second group of six subjects received time limited psychotherapy and the third group of ten subjects received running treatment. Running therapy consisted of individual runs (subject and running leader) three to four times a week for one hour and occasional group running (two to four persons not all of whom were subjects). By the fifth week only two sessions a week were with leader and by the seventh week this had dropped to one. Subjects were by this time encouraged to run by themselves three or more times a week. The results showed that of the eight who continued the running program for the full ten weeks, six showed a significantly changed depression score on the Symptom Checklist-90. Even though two subjects showed almost no change after the running program, it was still considered by the authors to be more successful than either psychotherapy program. Greist etal suggest nine possible explanations for the therapeutic effect of exercise on depressed patients:

i) Mastery - running is a skill and subjects develop a sense of success when it is mastered.

ii) Patience - running takes time and so patience is learned.

iii) Capacity for change - running shows that health, fitness and body image can be changed.

iv) Generalisation - once people realised that they could bring about some changes to themselves through running they felt able to change other parts of their lives.

v) Distraction - the physical sensations of running were a distraction from the physical sensations of depression.

vi) Positive Habit or "Addiction" - subjects substituted the positive activity they saw in running for some of the negative neurotic defences and habits.

vii) Symptom Relief - the physiological effects of running remove some of the symptoms of anger and anxiety.

viii) Consciousness Alteration - experienced runners describe a positive creative less conscious state after 15-30 minutes of exercise.

ix) Biochemical Changes - the changes in body chemistry associated with exercise interact with the changes associated with depression.

Blue (1979) used two former in-patients from a psychiatric hospital for subjects. Case one was a 37 year old male with a history of six previous admissions in two and a half years. Anti-depressants, empathy and cognitive therapy had not been successful, but after a running program was undertaken he moved from moderately depressed to mildly depressed on the Zung Depression Scale. Case two was a 32 year old female who had been given anti-depressants and therapy without any change being seen in her depression. A jogging program three times a week, however, caused her to move from moderate to minimal

depression on the Zung Depression Scale.

(b) Decrease in Arousal. In this section some studies which have examined the effect of a decrease in physiological arousal on depressed subjects will be discussed.

Stockings (1947) examined the effects of a marihuana homologue synhexyl on 50 clinically depressed patients. Of the 50 subjects, 36 showed marked improvement in condition while 14 had no change or a change for the worse. The author concluded that synhexyl is "a promising therapeutic agent for the treatment of the chronic and intractable depressive states".

Pond (1948) also used synhexyl as an attempted treatment for clinically depressed subjects but did not obtain results similar to those of Stockings' (1947). Pond found that synhexyl was not effective in the treatment of depression in the 14 subjects that he administered it to. He found that it produced drowsiness, lightheadedness and effects similar to alcohol intoxication, but it was of no benefit to any of the subjects tested.

Denber and Bird (1956) studied the effects of chlorpromazine on 45 subjects with a variety of depressions which included manic depression, dementia praecox and paranoid depression. The dosage of chlorpromazine used varied from 100mg to 600mg a day and the subjects received the treatment for between 5 months to 14 months. Of the 45, 15 were discharged from hospital, 22 showed no change. The authors concluded that chlorpromazine was an effective treatment for most depressive states.

Kotin, Post and Goodwin (1973) used a double-blind design to test the effects of delta-a-tetra-hydroconnabinol (THC) on eight depressed and hospitalised subjects. The study was intended to be carried out over a period of seven days but this proved to be impossible for some of the subjects. Four subjects underwent adverse reactions to THC, two of these after a single dose, and so were removed from the experiment. Of the other four, after seven days no anti-depressant effects were observed. The authors concluded "that THC is not an effective anti-depressant when given to hospitalised, depressed patients for one week in a double-blind trial".

(3) Elation

(a) Increase in Arousal. In this section studies which have examined the effect that an increase in physiological arousal has on elated subjects are discussed.

Folkins (1976) attempted to test the assumption that physical fitness affects emotional functioning. The subjects used were 40 men in the age range 40-58, all of whom were high coronary risk patients. They were matched by age, occupation and risk factors into exercise and control groups. The exercise group received three sessions per week for a period of 12 weeks while the control group were instructed not to exercise. Both groups were instructed not to undergo a change in diet, smoking behaviour or hypertension treatment. Measures of anxiety and depression were taken before and after the 12 week program and the results indicated the exercise group were happier, less anxious, less depressed, and felt better than the control group.

Noutis and Greenberg (1979) studied 18 experienced joggers aged between 17 and 55 to test whether physical exercise could change mood. All subjects completed the Mood Adjective Checklist before and after a 12.5 mile sponsored run and the State-Trait Anxiety Inventory was also completed. The results showed a large increase in pleasantness, an increase in activation and a decrease in anxiety, relaxation and sadness.

Wilson, Morley and Bird (1980) examined the possible differential mood changes across different types of running subjects. They used three distinct exercise

groups: marathon runners, joggers and non-exercisers. The Profile of Mood States was used to compare the three groups and it was found that marathon runners and joggers were less depressed, less angry, and less confused than non-exercisers, and also had more vigor. The marathon runners showed this effect to a greater degree than the joggers.

White, Fisbein and Rutstein (1981) used sexual-romantic attraction as the emotion they attempted to manipulate by an increase in physiological arousal. Running on the spot for either 120 seconds (14 male subjects) or 15 seconds (12 male subjects) was used to increase arousal and a self-report arousal questionaire was used to measure the change. Subjects were then shown a videotape of a female confederate made to look either attractive or unattractive by use of hairstyle, make-up and clothing changes. The results indicated that an aroused subject liked an attractive confederate more and an unattractive confederate less than an unaroused subject.

Lichtman and Poser (1983) had two aims:

i) to empirically measure the changes in mood and mental functioning that follow a period of exercise.

ii) to compare this to changes that occur in control subjects undergoing a pleasant activity, a hobby class.

64 subjects were used, of which 32 were in the exercise group and 32 were in the hobby class group. All subjects were tested before and after each experimental condition with the Nowlis Mood Scale, Profile of Mood States

and the Stroop Colour and Word Test. The exercise condition consisted of 45 minutes of jogging as well as some other physical activity. Subjects in this group were tested for a mean of 2.6 times a week for 1-5 weeks. The control group subjects were tested for a mean of 1.5 times a week at the hobby class for from 1-4 weeks. The results indicated that the exercise group were more elated and less anxious, depressed, angry, fatigued, unhappy and less serious and engaged in thought than the control group.

(b) Decrease in Arousal. In this section, some of the studies that have examined the effect that a decrease in physiological arousal has on happy or elated subjects will be discussed.

Randall, Heise, Schallek, Bagdon, Banziger, Boris, Moe and Abrams (1961) undertook an extensive study of the then newly released psychotherapeutic agent Valium. They tested its tranquilizer and muscle relaxant properties in animals and humans and found it to be five times as strong as Librium. The authors tested it on 18 subjects and found that it had a calming effect on most of them. They also found that it had a significant taming effect on animals.

Weil, Zinberg and Nelsen (1968) carried out a double-blind study on nine 21 to 26 year old male non-marihuana users to assertain the effects of marihuana on them. Tests carried out after an oral dose of marihuana included a self-rating mood scale at five minutes after, and again at 90 minutes after the dosage. The results for the mood scale at 15 minutes showed subjects reported

a small increase in euphoria, but this was reversed at 90 minutes.

Waskow, Olsson, Salzman and Katz (1970) in a similar study to Weil etal examined the effects of a constituent of marihuana, tetrahydrocannabinol, on a group of 95 male prisoners. The Clyde Mood Scale was used to measure before and after moods and it features six factors: friendly, aggressive, clear-thinking, sleepy, unhappy and dizzy. Measures were taken at 1½ hours and 3½ hours post drug. The results indicated few feelings of euphoria and no change in aggression. Most subjects were less clear-thinking, more sleepy and dizzy with little change in friendliness or unhappiness.

Cooper, Zanna and Taves (1978) designed a study to determine whether or not arousal is a necessary condition for attitude change in an induced compliance procedure. Subjects received either a tranquilizer, amphetamines, or a placebo in a blind design and then their degree of compliance to views expressed by the experimenter were recorded. The results indicated that the high arousal condition increased compliance, whereas in the tranquilizer condition this effect was eliminated.

(4) Anger

Increase and Decrease in Arousal. Both types of study will be included in this section because a large number of researchers have examined the effect of an increase and a decrease in arousal in the same experiment. It should be noted that most authors use aggression to describe the verbal or physical expression of anger.

Zillman (1971) looked at the effect that an increase in physiological arousal had on aggressive behaviour. Arousal was influenced by showing subjects a video of either an erotic film, an aggressive (fight) film, or a neutral (control) film. The measure of aggressive behaviour was how often the subject would deliver electric shocks to a confederate. The results showed that the conditions which caused an increase in physiological arousal, the erotic and the aggressive films also had higher rates of shocks given by subjects to confederates.

Zillman, Katcher and Milausky (1972) followed up Zillman (1971) but used strenuous exercise as an arousal altering mechanism instead of videos. Anger was manipulated by a confederate who delivered electric shocks to the subject, either a mild or a severe attack depending on whether the subject was in the high or low anger group. The results showed that subjects in the exercise group delivered greater intensity electric shocks to a confederate who had shocked them than low exercise subjects. The authors concluded that "... the results obtained are adequately accounted for by predictions from the two-factor theory and the excitation transfer theory of emotion".

Baron (1972) hypothesised that in the presence of prior anger arousal subjects would direct stronger anger attacks toward the anger instigator under uncomfortable, hot conditions than under comfortable, cold. If there was no prior anger arousal, however, temperature would have no effect. Anger was induced by a confederate administering electric shocks to the subject. The subject's anger was measured by the number and intensity of the shocks they delivered to the confederate when they were given the opportunity to retaliate. Baron did not, however, confirm his prediction as he found high temperatures inhibited aggressive responses no matter what the prior anger arousal. He did, however, suggest factors which he believed may have had an influence.

a) The temperature was so high that subjects worked to escape the conditions and to achieve this they completed the task as quickly as possible.

b) Subjects may have believed the anger instigator was also suffering from the high temperature and so lessened the attacks because of the shared suffering.

c) Subjects may have assumed that under the uncomfortably hot conditions the shocks they were giving would cause the confederate more pain than they would under normal conditions.

Zillman, Johnson and Day (1974) extended the work of Zillman (1971) and Zillman, Katcher and Milausky (1972). Anger-aggression was induced and measured in the same way as in the previous studies using electric shocks. Arousal was altered by the use of a stationary bicycle and subjects

were grouped based on the speed with which they recovered from strenuous exercise. They found that subjects with the faster recovery time from exercise were the least likely to get aggressive.

Konecni (1975) used a similar design to the previous study featuring electric shocks to both induce and measure anger-aggression. However, an adversely loud (97 db) noise was used to increase the subjects' level of physiological arousal. Konecni found that subjects in the loud noise group showed significantly more angry behaviour toward a confederate than subjects in a no noise group and subjects in a soft (73 db) noise group. He concluded that "In a more general sense, the results further corroborate the Schachter-Singer (1962) two-factor model of emotion ...".

Baron (1976) examined the effect of uncomfortable warm temperatures on a subject's angry or aggressive behaviour toward a confederate. The study used driving behaviour as the means to induce and measure the subjects' anger-aggression.

The technique adopted for this experiment involved using a pre-selected intersection with the subjects being motorists who chanced to be there at that time. Data were collected when the confederates car was in front of the subject's car at the chosen intersection with the traffic light red. When the light changed to green the confederate's car remained stationary and the time until the subject sounded the car horn was recorded. The results showed that under uncomfortable, hot conditions, subjects were quicker

to sound their car horn than under normal conditions. Baron also found the incompatable reactions distraction, empathy, humor and sexual arousal lessened the effect of uncomfortable hot temperature.

Baron and Bell (1976) added extra features to Baron's (1972) design. A cooling drink was used to reduce the impact of the high temperature condition which it did. The authors also found that high temperatures increase angry-aggressive behaviours when positive evaluations are given, but lessen angry-aggressive behaviours when negative evaluations are given. It was also found that warm temperatures produced a similar effect.

Donnerstein and Wilson (1976) conducted experiments to study the effects of noise on subsequent aggressive behaviour. Anger-aggression was induced using a procedure similar to Zillman (1971). The subject was first given electric shocks by the confederate and then later had the opportunity to "retaliate". There were two different anger conditions: high (nine shocks from confederate), and low (one shock from confederate), and two different arousal conditions: loud noise (95 db) and soft noise (55 db). The results were as the authors had predicted, subjects in the high anger, loud noise condition shocked the confederate with the greatest intensity; subjects in the soft noise, low anger, and loud noise, low anger, shocked the confederate with the least intensity.

Taylor, Vardaris, Rawtich, Gammon, Cranston, and Lubetkin (1976) compared the effects of delta-9-tetrahydrocannabinol (THC) and alcohol on aggressive

behaviour in 50 male subjects. The level of agression was measured by the intensity of electric shock the subject gave to a confederate. The experiment used two different dose levels for each drug so a subject was given one of either a high dose of alcohol (1.5oz of pure ethanol per 40 pounds of body weight), a low dose of alcohol (0.5oz per 40 pounds), a high dose of THC (0.3mg/kg) or a low dose of THC (0.1mg/kg). The results showed that the high dose THC group were less aggressive than the low dose THC group, but the high dose alcohol group were more aggressive than the low dose alcohol group.

Bell (1980) used two different temperature conditions (warm - 21-23°C and hot - 33-35°C) separately and in conjunction with two different noise conditions (soft - 55db and loud 95db) and examined the effect they had on subjects aggressive behaviour. Aggression was induced by an experimenter who was angry and discourteous toward the subject. Subsequent aggressive feelings of the subject were measured by a questionaire the subject was asked to complete about the experimenter. The results indicated that noise levels had no effect on the retaliatory comments of the subject but the high temperature condition resulted in the most negative evaluations of the experimenter by the subject.

(5) Summary

The direction of mood change from each of the eight types of studies which have been discussed is as follows:

1(a) Anxiety. Increase in arousal. Decrease in anxiety.

1(b) Anxiety. Decrease in arousal. Decrease in anxiety.

2(a) Depression. Increase in arousal. Decrease in depression.

2(b) Depression. Decrease in arousal. No trend was evident from the studies discussed.

3(a) Elation. Increase in arousal. Increase in elation.

3(b) Elation. Decrease in arousal. Decrease in elation.

4(a) Anger. Increase in arousal. Increase in anger.

4(b) Anger. Decrease in arousal. Decrease in anger.

However, these studies differed from each other in so many ways that it would be unwise to draw any general conclusions from them. For this reason an experiment was devised in which arousal could be manipulated in a similar way across the various moods discussed.

(6) Mood Introduction

In 1967 Emmett Velten submitted his PhD Dissertation which dealt with a technique to induce elation or depression by the reading of self-referential mood statements. Since then many researchers have used this method and have provided support for it.

Velten (1968) tested 100 female students for hypnotic susceptibility then divided them randomly into five groups. Group one were given 60 self-referential statements intended to be elating to read. Group two were given 60 self-referential statements intended to be depressing to read. Group three were given 60 statements not about mood to read. Groups four and five were given a treatment intended to produce a simulated depression or elation by demand characteristics. Pre-treatment mood was measured by two independent methods and seven behavioural tasks were used to measure the level of post-treatment elation or depression. The seven tasks used were:

i) Writing speed. Write out numbers in descending order from 100, stop after one minute.

ii) Distance approximation. Estimate a distance with eye closed by placing hands that distance apart.

iii) Decision time. Time taken to decide which of two tins was heavier.

iv) Perceptual ambiguity. A "vase and faces" type reversable figure was shown to subjects and they were to indicate when it reversed.

v) Word association. One word given and subjects asked to reply with another word.

vi) Multiple Affect Adjective Checklist, Today Form.

vii) Spontaneous verbalisations. Number of words spoken by subjects at a critical time were recorded.

The results showed the Elation and Depression treatments were different in five out of the seven measures in the predicted directions. The non-mood and demand groups showed no significant changes.

Natale (1977a) using Velten's mood induction procedure found that elated subjects had shorter response latencies, faster speech and articulation rates, and less silent pauses than a control group. Depressed subjects had significantly more silent pauses. Natale admitted that the effect could have been demand produced.

Natale (1977b) studied the effect of Velten's mood induction procedure on gaze behaviours. He found that elated subjects had longer eye gazes and more total eye contact than control subjects, whereas depressed subjects had less total eye contact and fewer eye contact gazes. These results are what Natale expected based on the eye gaze behaviour of depressed patients.

Frost, Graf and Becker (1979) divided the 60 self-referential statements from the Velten depression mood induction technique into two types. One type were those that referred to the somatic changes that occur in depression and the other type were those that were self-devaluative. Subjects were then given one of these two sets of statements and the amount of resulting depression

compared to a control condition. The authors found that the somatic statements had a greater effect than the self-devaluative statements.

Natale and Bolan (1980) attempted to extend the behavioural criteria of Velten's mood induction procedure for depression. They used two non-verbal behaviours that are associated with depression (hand movements and head down position) by the use of video recordings of the subject in an interview situation with an experimenter. The results showed a decrease in use of hand movements and an increase in head down postures in the depressed group. This was the expected result and supported the concept that Velten's mood induction procedure for depression produces behaviours similar to those in the clinically depressed.

Polivy and Doyle (1980) aimed to determine whether the results obtained by the Velten mood induction procedure are due to affective changes or demand characteristics. The authors found that there was significant evidence of demand characteristics having been a major cause of any reported mood change, but there was also evidence of true mood shifts. They concluded that "demand characteristics both contribute to the effect and falsely inflate measurements of it".

Teasdale and Russell (1983) studied the effect of induced moods on the recall of positive, negative and neutral words using a modified Velten mood inducing procedure. The major modification was to reduce Velten's 60 self-referential statements for each of depression and

elation to 12 statements for each. The authors found that their technique was sufficient to induce the appropriate mood in most subjects.

(7) Other

Davitz (1969) started his work into the language of emotion with the question "what does a person mean when he ways someone is happy or angry or sad?". The first step towards this goal was to develop a list of emotions. This was achieved by the use of a Roget's Thesaurus and 50 different emotions were found and recorded. The next step was to give the list of emotions to 1200 subjects and find out what each word meant to them. This resulted in 556 statements which were reduced by factor analysis to 12 clusters. The 12 clusters were then further reduced to four dimensions, each of which contains three clusters and is named so as to adequately represent each of the three.

DIMENSION	CLUSTERS		
	Positive	Negative Type I	Negative Type II
Activation	Activation	Hypoactivation	Hyperactivation
Relatedness	Moving Toward	Moving Away	Moving Against
Hedonic Tone	Comfort	Discomfort	Tension
Competence	Enhancement	Incompetence/ Dissatisfaction	Inadequacy

The activation, moving toward, comfort, enhancement clusters define the emotions which are generally regarded as positive or pleasant, whereas the other eight clusters define those emotions generally regarded as negative or unpleasant. The four dimensions are described by Davitz as:

Activation. Emotional energy or level of activation. A similar concept to Schachter and Singer's (1962) arousal.

Relatedness. An appraisal of the environment as beneficial or harmful which leads to an attraction or aversion.

Hedonic Tone. An appraisal of the environment as pleasant or unpleasant and including a tension-relaxation factor.

Competence. A directed self-motivated interaction with the environment which produces a feeling of efficacy.

The relative emphasis of each cluster in the definition of an emotion is set out by Davitz in table form [see Appendix 1] and indicates which clusters are dominant in a given emotion.

CHAPTER III

METHODOLOGY

3.1 AIM

To test by experiment the effect that a change in physiological arousal has on mood and so test Schachter and Singer's proposition 3. If Schachter and Singer's proposition 3 does not prove correct, then find another predictor.

3.2 RESEARCH QUESTIONS

(a) What effect will an increase in physiological arousal have on an experimentally induced mood?

(b) What effect will a decrease in physiological arousal have on an experimentally induced mood?

3.3 HYPOTHESES

(a) Anxiety will decrease with a decrease in arousal and decrease with an increase in arousal.

(b) Depression will decrease with an increase in arousal and increase with a decrease in arousal.

(c) Anger will increase with an increase in arousal and decrease with a decrease in arousal.

(d) Elation will increase with an increase in arousal and decrease with a decrease in arousal.

3.4 THE SAMPLE

60 subjects were used, with an age range of 13-47. 42 of the subjects were male and all were unpaid volunteers.

3.5 THE APPARATUS

Mood states were induced using one of three sets of cards. There were 12 cards in a set, each having a self-referential statement on it, eg: I feel I could strike out at someone. Three different types of cards were used to induce a distinct mood state.

(a) Depression

(b) Elation

(c) Anger

Sets (a) and (b) were the same as those used by Teasdale and Russell (1983), which they had developed by modifying statements that Velten (1968) had designed. The statements in set (c) were designed by the author based on descriptions in Clusters 3, 6 and 9 from Davitz (1969). [The complete list of all the self-referential statements from sets (a), (b) and (c) can be found in Appendix 2.]

The effectiveness of inducing a temporary mood by using self-referential mood statements has been shown by Velten (1968), Natale (1977a), Natale (1977b), Frost, Graf and Becker (1979), Natale and Bolan (1980), Polivy and Doyle (1980) and Teasdale and Russell (1983), and as

such was deemed by the author to be a satisfactory way to alter a subject's mood.

A mood scale was used to gauge the effect that the change in arousal had produced. It is a self-rating seven point scale featuring 13 distinct mood descriptions in a random order. The 13 descriptions of mood were obtained in this manner: one from each of Davitz (1969) 12 clusters plus one, excited to make a total of 13. [For a copy of the mood scale see Appendix 3.]

3.6 THE PROCEDURE

The experiment followed a 3 x 3 design using three different mood conditions against three different arousal conditions. The three mood conditions were:

(a) Depression

(b) Elation

(c) Anger

and the three arousal conditions were:

(a) Relaxation, which consisted of slow deep breathing for a period of five minutes.

(b) Control - a five minute delay with no activity.

(c) Exercise, which consisted of step-ups onto a chair for a period of five minutes.

There were 20 subjects in each group and they received all three experimental conditions, but the same mood state for each condition.

The experiment began when the subjects entered the room. They sat down, were told what was about to happen and were given instructions in the correct usage of the mood cards. They were then given a set of mood cards (which set depended on which group they were in) and told to begin. After they had read through all 12 cards in the alloted time of ten minutes, they were given the first of two identical mood scales to complete.

After this was done they underwent one of the three arousal conditions (relaxation, control or exercise) and immediately on finishing were given the second mood scale to complete. There was then a ten minute delay before the next arousal condition was started.

3.7 STATISTICAL ANALYSIS

The data were analysed by a student distribution to compare the before and after scores on the mood scales. This gives 13 results for each of the nine different conditions, but due to the experimental design quantitive comparisons between emotions, cannot be made on comparisons of the direction of change (if any).

CHAPTER IV

RESULTS

The results are presented here in table form. The first is depressed subjects' relaxation condition (D.Rx).

EMOTION	BEFORE MEAN	AFTER MEAN	LEVEL OF SIGNIFICANCE
Happy	2.95	2.75	Not Significant
Anxious	2.2	1.75	0.10
Resentful	2.0	2.05	Not Significant
Content	2.95	2.65	Not Significant
Guilty	1.35	1.15	Not Significant
Excited	1.85	1.6	Not Significant
Sad	2.3	2.45	Not Significant
Angry	1.6	1.45	Not Significant
Confident	2.7	2.3	Not Significant
Depressed	2.55	2.65	Not Significant
Hateful	1.0	1.55	0.10
Apathetic	3.1	2.4	0.05
Affectionate	1.9	1.7	Not Significant

The results show a significant decrease in anxiety and apathy and a significant increase in hate. No other changes are significant.

Depressed subjects' control condition (D.C).

EMOTION	BEFORE MEAN	AFTER MEAN	LEVEL OF SIGNIFICANCE
Happy	2.0	2.1	Not Significant
Anxious	2.15	1.95	Not Significant
Resentful	1.65	1.7	Not Significant
Content	2.5	2.45	Not Significant
Guilty	0.75	0.7	Not Significant
Excited	1.7	1.75	Not Significant
Sad	2.05	2.05	Not Significant
Angry	1.45	1.6	Not Significant
Confident	2.65	2.75	Not Significant
Depressed	2.45	2.35	Not Significant
Hateful	0.9	0.95	Not Significant
Apathetic	2.55	2.95	Not Significant
Affectionate	1.85	1.85	Not Significant

There were no significant differences between the before and after means for any of the emotions in this condition.

Depressed subjects' exercise condition (D.Ex).

EMOTION	BEFORE MEAN	AFTER MEAN	LEVEL OF SIGNIFICANCE
Happy	2.45	3.4	0.01
Anxious	1.65	1.55	0.005
Resentful	1.95	1.35	0.10
Content	2.4	3.15	0.025
Guilty	1.15	0.6	0.025
Excited	1.95	2.9	0.01
Sad	1.95	0.9	0.0005
Angry	1.4	0.75	0.025
Confident	2.25	3.25	0.005
Depressed	2.85	0.95	0.0005
Hateful	1.25	0.6	0.025
Apathetic	2.8	2.15	0.025
Affectionate	1.3	1.9	0.10

The results show a significant increase in happiness, contentment, excitement, confidence and affection, and a significant decrease in anxiety, resentment, guilt, sadness, anger, depression, hate and apathy.

Angry subjects' relaxation condition (A.Rx).

EMOTION	BEFORE MEAN	AFTER MEAN	LEVEL OF SIGNIFICANCE
Happy	1.15	0.95	Not Significant
Anxious	2.6	1.5	0.0005
Resentful	2.8	2.4	0.10
Content	1.45	1.5	Not Significant
Guilty	1.35	1.4	Not Significant
Excited	2.4	1.9	0.05
Sad	1.7	1.6	Not Significant
Angry	2.8	2.55	0.10
Confident	1.75	1.75	Not Significant
Depressed	1.0	1.1	Not Significant
Hateful	2.7	2.65	Not Significant
Apathetic	1.3	1.2	Not Significant
Affectionate	2.05	1.65	0.10

The results show no significant increases and a significant decrease in anxiety, resentment, excitement, anger and affection.

Angry subjects' control condition (A.C).

EMOTION	BEFORE MEAN	AFTER MEAN	LEVEL OF SIGNIFICANCE
Happy	1.3	1.25	Not Significant
Anxious	1.5	1.2	0.10
Resentful	3.1	2.95	Not Significant
Content	1.15	1.05	Not Significant
Guilty	1.3	1.2	Not Significant
Excited	2.55	2.35	Not Significant
Sad	1.95	2.05	Not Significant
Angry	3.05	2.9	Not Significant
Confident	1.7	2.0	Not Significant
Depressed	0.9	1.1	Not Significant
Hateful	2.85	2.75	Not Significant
Apathetic	1.0	1.1	Not Significant
Affectionate	2.2	2.05	Not Significant

The results show a significant decrease in anxiety and no significant increases.

Angry subjects' exercise condition (A.Ex).

EMOTION	BEFORE MEAN	AFTER MEAN	LEVEL OF SIGNIFICANCE
Happy	1.4	1.55	Not Significant
Anxious	1.4	0.8	0.005
Resentful	3.25	3.85	0.05
Content	1.3	1.35	Not Significant
Guilty	1.95	1.4	0.05
Excited	2.45	4.05	0.0005
Sad	1.8	1.3	0.05
Angry	2.9	3.4	0.025
Confident	2.15	2.45	0.10
Depressed	0.75	0.4	0.01
Hateful	3.0	3.75	0.005
Apathetic	1.1	0.6	0.005
Affectionate	2.65	2.05	0.005

The results show a significant increase in resentment, excitement, anger, confidence and hate, and a significant decrease in anxiety, guilt, sadness, depression, apathy and affection.

Elated subjects' relaxation condition (E.Rx).

EMOTION	BEFORE MEAN	AFTER MEAN	LEVEL OF SIGNIFICANCE
Happy	2.8	3.65	0.005
Anxious	2.6	1.0	0.0005
Resentful	1.15	0.55	0.005
Content	3.35	4.3	0.005
Guilty	1.1	0.4	0.0005
Excited	2.05	0.95	0.0005
Sad	1.6	0.8	0.005
Angry	0.7	0.3	0.025
Confident	3.7	3.7	Not Significant
Depressed	1.1	0.75	0.10
Hateful	0.5	0.2	0.01
Apathetic	1.35	1.8	0.10
Affectionate	2.9	2.9	Not Significant

The results show a significant decrease in anxiety, resentment, guilt, excitement, sadness, anger, depression, hate and happiness, and an increase in contentment and apathy.

Elated subjects' control (E.C).

EMOTION	BEFORE MEAN	AFTER MEAN	LEVEL OF SIGNIFICANCE
Happy	3.7	3.7	Not Significant
Anxious	1.2	1.1	Not Significant
Resentful	0.75	0.7	Not Significant
Content	2.95	3.1	Not Significant
Guilty	0.8	0.65	Not Significant
Excited	2.8	2.6	Not Significant
Sad	1.1	1.0	Not Significant
Angry	0.6	0.55	Not Significant
Confident	2.3	2.55	Not Significant
Depressed	0.5	0.6	Not Significant
Hateful	0.6	0.55	Not Significant
Apathetic	0.65	0.75	Not Significant
Affectionate	2.2	2.25	Not Significant

The results show no significant changes.

Elated subjects' exercise condition (E.Ex).

EMOTION	BEFORE MEAN	AFTER MEAN	LEVEL OF SIGNIFICANCE
Happy	3.3	3.7	0.10
Anxious	1.5	1.25	Not Significant
Resentful	1.95	0.8	0.0005
Content	3.25	3.95	0.01
Guilty	1.0	0.5	0.025
Excited	1.6	2.4	0.005
Sad	1.65	1.1	0.05
Angry	0.7	0.35	0.01
Confident	3.2	3.35	Not Significant
Depressed	1.95	1.5	Not Significant
Hateful	0.45	0.25	0.10
Apathetic	1.8	1.05	0.01
Affectionate	2.2	2.8	0.05

The results show a significant increase in happiness, contentment and affection and a significant decrease in resentment, guilt, excitement, sadness, anger, hate and apathy.

To summarise the results then:

1(a) Anxiety. Increase in arousal. Decrease in anxiety.

1(b) Anxiety. Decrease in arousal. Decrease in anxiety.

2(a) Depression. Increase in arousal. Decrease in depression.

2(b) Depression. Decrease in arousal. No change.

3(a) Elation. Increase in arousal. Increase in elation.

3(b) Elation. Decrease in arousal. Decrease in elation.

4(a) Anger. Increase in arousal. Increase in anger.

4(b) Anger. Decrease in arousal. Decrease in anger.

CHAPTER V

DISCUSSION

The results show change in the same directions as was predicted on the basis of the literature in all conditions except D.Rx. This could be due to a number of factors:

i) On the basis of the literature it was impossible to ascertain the trend because there was conflicting evidence. The direction of change expected then was based on the opposite of that expected for D.Ex.

ii) There was a change in the correct direction of excitement in all Rx and Ex conditions except D.Rx. This may indicate that the relaxation procedure had a minimal or no effect on the subjects.

iii) The method of mood induction for depression may be such that it is extremely difficult to increase the level of depression by purely physiological means.

The anger cards devised by the author for this study appeared to be as effective as either the elation or depression cards.

The major faults with the experimental design are:

i) No attempt was made to screen subjects on the basis of hypnotic suggestibility or to their degree of mood change after their first reading of the cards.

ii) The same subjects were used for all three

parts of each mood condition. This may increase the likelihood of demand characteristics, or it may lead to the subjects becoming bored and not thinking about their mood when they complete the self-report inventory.

iii) The same order of arousal conditions was used for all subjects. The order used was Rx, C, Ex, and was chosen because the effect of Rx was found to be very short lasting, whereas the effect of Ex was long lasting. If Ex had been used before Rx, the effect would have been to increase the Rx effect as arousal would be decreasing due to Ex wearing off.

iv) The method of inducing arousal produces a change in cognitions. It is impossible to gauge the effect this has and it is also impossible to remove if exercise and relaxation are used to change arousal levels.

Future research could go some way to overcoming these problems by:

i) The use of a modified form of relaxation (possibly hypnotic) to induce a larger decrease in arousal.

ii) Screening subjects either before the first reading of the mood cards on the basis of a hypnotic suggestibility test, or after the first reading on the basis of the degree of change.

iii) Subjects used for only one part of the experiment and not three. This would also remove the need for counterbalancing.

iv) The use of a different technique to alter

arousal which will have less cognitive effect. Temperature changes have been shown to be effective by Baron (1972), Baron (1976), Baron and Bell (1976) and Bell (1980), and may also be effective in this type of design.

Any results obtained using these suggested modifications, however, are unlikely to produce any substantial differences from the results reported here.

These results do not support Schachter and Singer's proposition three. Although they could have predicted the results obtained for the moods anger and elation, the depression result is the opposite. There is, however, a predictor which can account for all the data without being radically different from Schachter and Singer's propositions.

The predictor is in Davitz (1969) which contains a cluster analysis of emotion items. From a starting point of 50 emotions Davitz reduces them to 12 clusters which are further reduced to four dimensions. One of these dimensions is called activation and it contains the clusters activation, hypoactivation and hyperactivation. As Davitz's activation and Schachter and Singer's arousal appear to describe the same thing, this makes Davitz's work very important in the present context. Davitz showed that some emotions are characterised by hypoactivation (which is low activation) some by hyperactivation (high activation), and some by activation (in between hypo-and hyperactivation). This means that the higher the relative emphasis of the activation of hyperactivation cluster in the definition of the emotion, the greater the effect an increase or

decrease in arousal will have. Emotions with these clusters then will behave in the way Schachter and Singer predicted when arousal is manipulated. Emotions with a high relative emphasis of the hypoactivation cluster, however, will behave differently. This is because an increase in arousal is totally incompatible with the hypoactivation cluster, so a competing emotional response will be facilitated. This explains why an increase in arousal leads to a decrease in depression, they are incompatible.

It seems likely (at least in theory) that a decrease in arousal in a depressed person should result in an increase in depression. There are two reasons for this:

i) The likelihood of a competing high arousal emotion is reduced.

ii) The depression is enhanced because it is a low arousal emotion.

In practice, however, this need not necessarily be the case. The amount of change possible may be too small to have any effect. In the present experiment there was no decrease in arousal in depressed subjects. It is also possible that the level of physiological arousal is more critical for emotions with a high emphasis on the hypoactivation cluster. This would mean that a very low level of arousal would be a prerequisite for the emotion and to further lower the arousal would be extremely difficult. Depression is also characterised by other clusters though,

and it may be that any attempts to lower arousal have an effect on these. This also seems true of anxiety.

Anxiety is one of the few emotions with no emphasis on any cluster from the activation dimension. The clusters with the highest relative emphasis in anxiety are tension and inadequacy, both of which will be lessened by relaxation and exercise thus explaining why anxiety is affected by any change in arousal.

For all these things to be so, the activation dimension needs to be undifferentiated as is arousal, and that does not appear to be the case. Davitz differentiates between activation (the cluster) and hyperactivation. If they are in fact different this would mean that for any emotion with a high relative emphasis on activation an increase in arousal will result in a lessening of that emotion. The effect would be the same as for emotions with a high relative emphasis on hypoactivation, the high arousal would be incompatible with the emotion. This is not the case, however, and shows that activation and hyperactivation clusters do not have arousal differences, only cognitive differences. If Davitz's 12 clusters were to be reduced as far as possible, it seems we would be left with arousal and cognition. This is because all of Davitz's four dimensions feature appraisals. In three of the dimensions (relatedness, hedonic tone and competence) this is stated by Davitz in the description, but in the fourth (activation) it is not. The activation and hyperactivation clusters are differentiated by way of a pleasant-unpleasant appraisal. Pleasant arousal is characteristic

of the activation cluster, whereas unpleasant arousal is characteristic of hyperactivation.

CHAPTER VI

CONCLUSION

As we have seen, neither of Schachter and Singer's claims were supported by all the data although partial support was provided for them both. The results themselves however, could not provide a complete picture because of the inability to produce any change in the D.Rx condition.

Davitz's cluster scores were a very powerful predictor of the results and were also an excellent source of emotion terms for the mood scale. Further use was made of Davitz's work in the choice of statements for the anger cards which proved to be as effective as the existing elation and depression cards designed by Velten (1968).

This study, as the first of its type to combine three different mood conditions with three levels of arousal, produced results consistent with that of other authors who used a variety of different methods to alter arousal and induce mood changes.

This study then has been effective in testing two of Schachter and Singer's claims and has shown them to be unable to explain all the data.

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	Cluster Scores Indicating Relative Emphasis of Each Cluster in the Definition of Each Emotional State											
	Cluster											
Emotion	Activation	Hypo-activation	Hyper-activation	Moving Toward	Moving Away	Moving Against	Comfort	Discomfort	Tension	Enhancement	Incompetence: Dissatisfaction	Inadequacy
Admiration	14.8	0	0	12.6	0	0	10.2	0	0	3.0	0	0
Affection	15.4	0	0	47.0	0	0	22.4	0	0	4.0	0	0
Amusement	22.6	0	0	0	0	0	21.0	0	0	0	0	0
Anger	0	0	53.0	0	0	46.0	0	0	19.0	0	0	16.8
Anxiety	0	0	0	0	0	8.0	0	7.2	18.2	0	4.4	20.2
Apathy	0	36.8	0	0	38.0	0	0	0	0	0	0	0
Awe	14.2	0	12.6	0	0	0	3.0	0	0	0	0	5.4
Boredom	0	51.2	0	0	28.0	0	0	0	9.0	0	12.0	0
Cheerfulness	46.4	0	0	5.2	0	0	43.6	0	0	24.6	0	0
Confidence	23.2	0	0	7.6	0	0	29.8	0	0	68.2	0	0
Contempt	0	0	10.6	0	0	26.4	0	0	25.2	0	0	4.8
Contentment	6.8	0	0	5.0	0	0	51.0	0	0	13.6	0	0
Delight	44.2	0	12.8	5.8	0	0	35.0	0	0	3.0	0	0
Depression	0	48.6	0	0	38.0	0	0	41.8	5.4	0	19.0	35.2
Determination	9.8	0	16.8	0	0	0	0	0	5.4	32.6	0	7.4
Disgust	0	3.4	5.4	0	0	0	0	0	9.8	0	0	5.4
Dislike	0	0	0	0	0	14.8	0	0	10.4	0	5.0	0
Elation	43.4	0	24.2	0	0	0	29.6	0	0	28.6	0	5.4
Embarrassment	0	0	21.2	0	10.2	0	0	3.4	10.4	0	34.2	6.6
Enjoyment	48.2	0	0	2.6	0	0	44.8	0	0	9.4	0	0
Excitement	28.6	0	31.4	0	0	0	5.8	0	5.0	0	0	11.8
Fear	0	0	44.6	0	5.4	0	0	0	26.0	0	4.8	45.4
Friendliness	23.0	0	0	25.8	0	0	27.6	0	0	10.8	0	0
Frustration	0	4.6	4.8	0	0	7.2	0	3.8	45.6	0	12.8	21.8
Gaiety	50.2	0	14.6	10.2	0	0	42.6	0	0	17.4	0	0
Gratitude	5.6	0	0	7.8	0	0	21.8	0	0	3.4	0	0
Grief	0	14.2	0	0	8.2	0	0	38.2	4.2	0	10.8	20.0
Guilt	0	3.4	0	0	0	0	0	10.2	14.8	0	35.2	4.8
Happiness	56.6	0	5.8	3.6	0	0	42.8	0	0	26.8	0	0
Hate	0	0	22.6	0	0	54.0	0	6.8	42.2	0	4.6	14.6
Hope	4.6	0	0	0	0	0	4.0	0	0	0	0	0
Impatience	0	0	0	0	0	0	0	0	26.0	0	12.0	6.0
Inspiration	23.0	0	11.4	0	0	0	10.8	0	0	36.8	0	10.2
Irritation	0	0	10.2	0	0	15.6	0	0	42.0	0	11.2	0
Jealousy	0	0	7.0	0	0	24.0	0	11.0	32.2	0	6.0	11.2
Love	29.6	0	12.0	66.0	0	0	32.2	0	0	17.6	0	6.7
Nervousness	0	0	14.2	0	0	0	0	16.0	33.0	0	5.2	15.4
Panic	0	0	47.6	0	4.6	0	0	4.2	11.4	0	0	44.8
Passion	11.2	0	45.2	38.0	0	0	6.4	0	0	0	0	15.2
Pity	0	0	0	5.2	0	0	0	15.4	0	0	10.8	10.6
Pride	27.0	0	5.4	0	0	0	18.4	0	0	28.4	0	0
Relief	10.4	0	0	0	0	0	28.8	0	0	3.4	0	0
Remorse	0	12.2	0	0	0	0	0	25.4	4.2	0	46.4	11.2
Resentment	0	3.6	5.8	0	0	25.6	0	0	46.8	0	4.4	12.6
Reverence	7.4	0	4.8	0	0	0	13.6	0	0	6.6	0	10.8
Sadness	0	13.8	0	0	0	0	0	35.8	0	0	7.6	10.6
Serenity	13.0	3.6	0	0	0	0	42.0	0	0	7.4	0	0
Shame	0	3.4	0	0	5.8	0	0	0	0	0	47.6	5.2
Solemnity	0	0	0	0	0	0	3.0	0	0	0	0	5.8
Surprise	11.4	0	28.2	0	0	0	4.2	0	0	0	0	0

APPENDIX 2

(A) DEPRESSED MOOD INDUCTION STATEMENTS

The 12 statements that make up the depressed mood cards are:

I feel unhappy.

I feel sad and blue.

I feel fed up.

I just feel drained of energy, worn out.

I feel pretty low.

Things seem futile, pointless.

I feel hopeless.

I feel downhearted and miserable.

I feel so tired and gloomy that I would rather just sit than do anything.

I feel heavy and sluggish.

It seems such an effort to do much.

I'm fed up with it all.

(B) ELATED MOOD INDUCTION STATEMENTS

The 12 statements which make up the elated mood cards are:

I feel pretty good right now.

I feel happy.

I feel cheerful, confident.

I can think quickly and clearly right now.

Right now I feel very contented.

Right now I feel like smiling.

I feel alert, happy and full of energy.

I have a feeling of lightness and joy.

I really like this light-hearted feeling.

I can feel a smile on my face.

I feel so good I almost feel like laughing.

It feels great to be alive!

(C) ANGRY MOOD INDUCTION STATEMENTS

The 12 statements which make up the angry mood cards are:

I feel angry.

I feel I could explode.

I feel I could strike out at someone.

I feel upset.

I feel hot and active.

I can't slow down.

I'm annoyed.

I feel pressure building up inside of me.

I'm tense.

I can't keep this pressure inside me any longer.

I feel I want to get even.

My heart is pounding.

APPENDIX 3

MOOD SCALE

NAME: SEX: AGE:

Circle the number that indicates how you feel at the moment. Do not spend too much time on any one word. There are no right or wrong answers.

Happy	0	1	2	3	4	5	6
Anxious	0	1	2	3	4	5	6
Resentful	0	1	2	3	4	5	6
Content	0	1	2	3	4	5	6
Guilty	0	1	2	3	4	5	6
Excited	0	1	2	3	4	5	6
Sad	0	1	2	3	4	5	6
Angry	0	1	2	3	4	5	6
Confident	0	1	2	3	4	5	6
Depressed	0	1	2	3	4	5	6
Hateful	0	1	2	3	4	5	6
Apathetic	0	1	2	3	4	5	6
Affectionate	0	1	2	3	4	5	6